Wool
Standardization
Laboratory
U.S. DEPT. of AGRIC.
Wash. 25, D. C.

AMERICAN SOCIETY FOR TESTING MATERIALS
Meeting of Committee D-13, March 13-15, 1946
New York, N. Y.

Report of Section I, Subcommittee A-3 on Wool

Attendance

Section I of Subcommittee A-3 on wool met Wednesday March 13, 1946, with the following in attendance:

| | |
|---|---|
| H. R. Anderson | Abbot Worsted Co., Forge Village, Mass. |
| C. B. Armstrong | United Merchants, New York, N. Y. |
| A. G. Ashcroft | Alex. Smith & Sons Carpet Co., Yonkers, N. Y. |
| O. P. Beckwith | Alex. Smith & Sons Carpet Co., Yonkers, N. Y. |
| C. H. Black | Lever Bros. Co., Cambridge, Mass. |
| H. M. Block | U. S. Testing Co., Boston, Mass. |
| A. L. Brassell | U. S. Testing Co., Hoboken, N. J. |
| Bernice S. Bronner | American Standards Association, New York, N. Y. |
| R. L. Brown | Lowell Textile Institute, Lowell, Mass. |
| W. M. Buck | U. S. Department of Agriculture, Washington, D. C. |
| E. W. Calkins | Pacific Mills, East Newark, N. J. |
| L. Christison | American Woolen Company, Andover, Mass. |
| A. B. Coe | U. S. Testing Co., Hoboken, N. J. |
| F. D. Cronin | U. S. Department of Agriculture, Washington, D. C. |
| T. J. Dabrowski | United Merchants, N. Y. |
| John N. Dalton | Pacific Mills, Lawrence, Mass. |
| J. L. Dearnley | Dearnley Bros. Worsted Spinning Co., Philadelphia, Pa. |
| D. E. Douty | U. S. Testing Co., Hoboken, N. J. |
| H. Ehrhardt | Botany Worsted Mills, Passaic, N. J. |
| Howard L. Eisen | Industrial By-Products and Research Co., Philadelphia, Pa. |
| Eleanor L. Fisher | Sears, Roebuck & Co., Chicago, Ill. |
| F. W. Gatenby | Abbot Worsted Co., Graniteville, Mass. |
| C. C. Gordon | Albany Felt Co., Albany, N. Y. |
| H. C. Haller | Continental Mills, Inc., Philadelphia, Pa. |
| John I. Hardy | U. S. Department of Agriculture, Washington, D. C. |
| Leone Ann Heuer | Household Finance Corp. Chicago, Ill. |
| John Hintermaier | Forstmann Woolen Company, Passaic, N. J. |
| W. H. Horne | F. C. Huyck & Sons, Kenwood Mills, Albany, N. Y. |
| Robert Jackson | Bigelow-Sanford Carpet Co., Thompsonville, Conn. |
| W. B. Lane | West Point Mfg. Co., Shawmut, Alabama |
| P. Larose | National Research Council, Ottawa, Canada. |
| B. Paul Lynam | Warwick Mills, Boston, Mass. |
| Robert Levitch | Bigelow-Sanford Carpet Co., Thompsonville, Conn. |
| R. T. McAndrew | U.S. Testing Co., Boston, Mass. |
| S. T. Marchant | U. S. Testing Co., Hoboken, N. J. |
| H. R. Mauersberger | Textile Book Publishers, New York, N. Y. |
| S. C. Mayne, Jr. | U. S. Testing Co., Hoboken, N.J. |
| George Moro | Forstmann Woolen Company, Passaic, N. J. |
| W. A. Mueller | U. S. Dept. Agriculture, Washington, D. C. |
| Fred Noechel | Botany Worsted Mills, Passaic, N. J. |
| Ruth O'Brien | U. S. Dept. Agriculture, Washington, D. C. |
| Frank J. O'Neil | Pacific Mills, Lawrence, Mass. |
| S. L. Peebles | Mohawk Carpet Mills Inc., Amsterdam, N. Y. |
| H. A. Reinhardt | Bigelow-Sanford Carpet Co., Thompsonville, Conn. |
| A. L. Smith | Milton Harris Associates, Washington, D. C. |
| Louis Tanner | U.S. Customs Laboratory, Boston, Mass. |
| G. Tattersfield | Dearnley Bros. Worsted Spinning Co., Philadelphia, Pa. |
| T. Smith Taylor | U. S. Testing Co., Hoboken, N. J. |
| L. H. Turl | Ontario Research Foundation, Toronto, Canada |
| Werner von Bergen | Forstmann Woolen Company, Passaic, N. J. |
| L. I. Weiner | Philadelphia Quartermaster Depot, Philadelphia, Pa. |
| C. O. Werner | American Viscose Corp., Marcus Hook, Pa. |
| H. J. Wollner | American Conditioning House, Boston, Mass. |

Fineness Measurement - WIRA method

The method of wool fineness measurement employed by the Wool Industries Research Association of England, a draft of which had previously been sent to the membership, was discussed in detail. Among elements of the WIRA method favored for inclusion in the ASTM method were the practice of having all tests performed by two operators, and requirements for greater statistical control. It was pointed out that 472-41 says the dispersion factor may be expressed in terms of standard deviation and the limits for the average in terms of Ps=.90. The WIRA method requires the calculation of standard deviation in order to test for significant difference between the observed and some other or standard average. From a practical standpoint, WIRA employs 3% of the average for the grade as a basis for discriminating grade averages, and it was urged that we adopt 3% as a working maximum and minimum for testing averages. WIRA also requires the measurement of 1000 fibers on the assumption of a coefficient of variation of 25%. Data available show that this factor may be as low as 18% for fine wools and may range to 26% and more for coarse wools. It was suggested that 1000 fibers be adopted by ASTM as the sample size for 56s and coarser, and the smaller sample sizes be retained for the finer grades. Examples of specification limits for fineness averages of 80s and 70s, as determined by several measures, are given below in microns:

| Grade | 80s | 70s |
|---|---|---|
| Fibers | 400 | 400 |
| Average for standard | 18.8 | 20.3 |
| Limits - standard | 18.1 - 19.5 | 19.6 - 21.0 |
| " Ps=.90 | 18.5 - 19.1 | 19.37 - 20.03 |
| " 3% of average | 18.24 - 19.36 | 19.7 - 20.9 |
| " 3 SE | 18.26 - 19.34 | 19.7 - 20.9 |

Measuring Error

Some information was presented on fineness measuring error. To study this factor, an analysis was made of result obtained through interlaboratory tests on 80s and 70s top. Details follow:

Grade 80s top, long fiber method

| Lab. | Average Microns | Error from Grand Average |
|---|---|---|
| 1 | 19.23 | 0.273 |
| | 19.38 | 0.123 |
| 2 | 19.54 | 0.037 |
| | 19.30 | 0.203 |
| | 19.70 | 0.197 |
| 3 | 19.91 | 0.407 |
| 4 | 19.74 | 0.237 |
| 5 | 19.40 | 0.103 |
| | 19.33 | 0.167 |
| 6 | 19.5 | 0.003 |
| Grand Average | 19.503 | 0.175 |

Grade 70s top, long fiber method

| Lab. | Average Microns | Error from Grand Average |
|---|---|---|
| 1 | 20.03 | 0.16 |
| | 20.01 | 0.14 |
| 2 | 19.3 | 0.57 |
| | 20.9* | 1.03* |
| | 20.0 | 0.13 |
| | 20.2 | 0.33 |
| | 20.0 | 0.13 |
| 3 | 19.57 | 0.30 |
| 4 | 18.94* | 1.07* |
| | 18.62* | 1.25* |
| Grand Average | 19.757 | 0.511 |
| Adj. Grand Average | 19.87** | 0.251** |

* Out of control.

** Average after omitting out-of-control data

Operator training - special test stock

On account of the absence of desired uniformity in results obtained by different operators and laboratories in the measurement of samples from the same lot, as shown by the analysis of the data on 80s and 70s, and referred to as measuring error, greater emphasis on operator training was suggested. A proposal was made that thoroughly uniform top be used for training and test purposes. It was thought that this top would have to be specially prepared by repeated blending to produce a sliver with minimum variation throughout its length. This could be done for fine, medium and coarse grades. The suggestion was made that the United States Department of Agriculture be the repository for this stock and be the agency for its distribution to the laboratories and investigators.

Ability of operators to remeasure same fibers.

Based on the data available on the measurement of the special slides of 60s and 44s wool top, a limited study was made of the ability of operators to remeasure the same fibers. The findings reported were as follows:

| | Percent of fibers | | | | |
|---|---|---|---|---|---|
| Deviations in microns | 60s Wool Top | | 44s Wool Top | | |
| | Oper. 1 | Oper. 2 | Oper. 1 | Oper. 2 | Oper. 3 |
| under 0.2 | 51 | 92 | 38 | 93 | 24 |
| .3 | 69 | 99 | 54 | 99 | |
| .4 | 84 | | 71 | 100 | |
| .5 | 90 | | 84 | | 46 |
| 0.5 and over | 10 | 1 | 16 | | 54 |
| Average deviation | 0.120 | 0.069 | 0.153 | 0.047 | 1.039 |

The figures under "percent of fibers" are the percentage distributions of errors. These were obtained by finding the difference between each operator's first and second measurement on each of 100 fibers. All operators measured the same fibers.

Long fiber method vs. Short fiber method

Demonstrations were given of the method of preparing slides by the short section method. Through this method, with the use of the heavy duty type fiber sectioning device, a quantity of fibers representing and entire cross section of a sliver can be placed on a slide at one time. Effort is made to cut the fibers to a length of about 75 microns. If a thorough comparison of the two methods of measurement were desired, it was thought necessary that an extensive study be made. That the short fiber method would give a coarser measurement was the prevailing opinion, and this tendency was indicated in the analyses reported on some lots as follows:

| Grade | 80s | | 70s | |
|---|---|---|---|---|
| Method | Long | Short | Long | Short |
| Laboratories | 6 | 2 | 4 | 1 |
| Operators | 10 | 7 | 10 | 4 |
| Fibers in Gr.Av. | 4000 | 2800 | 2800 | 1600 |
| Grand average, microns | 19.503* | 19.818* | 19.87** | 20.12** |
| Standard deviation | 3.49 | 3.715 | 3.91 | 4.073 |
| Standard error (400) | 0.175 | 0.186 | 0.196 | 0.204 |
| C. Variation % | 17.9 | 18.75 | 19.67 | 20.24 |

*Difference of 0.315 significant
**Difference of 0.25 not significant
**19.87 adjusted average by removal of out-of-control data

| Grade | Coarse No. 1 | | | | Coarse No. 2 | | | |
|---|---|---|---|---|---|---|---|---|
| Method | Long | Short | Long | Short | Long | Short | Long | Short |
| Fibers | 800 | 800 | 800 | 800 | 800 | 800 | 800 | 800 |
| Average | 36.53 | 36.54 | 37.11 | 36.42* | 38.73 | 38.50 | 38.86 | 38.83 |
| St. Dev. | 6.97 | 6.77 | 6.72 | 7.01 | 9.02 | 8.10 | 8.80 | 8.43 |

*Difference 0.69 microns significant (0.95 Prob.)

The WIRA method, previously referred to, is based on the short fiber technique, which provides better sampling and more thorough fiber mixing than the long fiber method described in Designations 419 and 472.

Distribution of fibers at coarse end

A study was made of the distribution of the coarse end of a sample of 70s standard top, 20000 fibers, and a sample of 36s standard top, 24000 fibers. The slides were repeatedly traversed and the fibers observed in units of 2000 for the 70s top and 1600 for the 36s top. All fibers were counted and measurements were made of fibers greater than 30 microns in the 70s top, and greater than 50 microns in the 36s top. In the measurements of the 70s top of the 10 wedges of 2000 fibers each, the percentage of fibers measuring greater than 30 microns varied from a low of 2.10% to a high of 2.85% with an overall average of 2.57%. In the measurements of the 36s top of the 15 wedges of 1600 fibers each, the percentage of fibers greater than 50 microns varied from a low of 11.2% to a high of 15.4% with an overall average of 13.4%. The following table gives the distributions:

Distribution of Coarse End of 20,000 Fibers of 70s Top and 24,000 Fibers of 36s Top

| | 70s (short section) | | 36s (long section) | |
|---|---|---|---|---|
| | Classes of 2.5 microns | % of 20,000 | Classes of 2.5 microns | % of 24,000 |
| | 13 | 1.16 | 21 | 5.5 |
| | 14 | .71 | 22 | 3.4 |
| | 15 | .34 | 23 | 2.1 |
| | 16 | .14 | 24 | 1.1 |
| | 17 | .07 | 25 | 0.6 |
| | 18 | .03 | 26 | 0.3 |
| | 19 | .03 | 27 | 0.2 |
| | 22 | .005 | 28 | 0.1 |
| | 23 | .005 | 29 | — |
| | 28 | .005 | 30 | 0.1 |
| Total | 13-28 | 2.57% | 21-30 | 13.4% |

Further analyses to embrace all grades of the standards was suggested.

Wedge Scale with Fixed Base Line

Reports were presented on a newly designed wedge scale with fixed base line. Two styles had been prepared, one with wedge lines only, the other with cross lines dividing the wedge into classes of 2.5 microns each. Users reported no essential difference in the measuring results with the two types, opinion being divided on the merits of the cross lines. As designed, the scale had a single fixed base line with several inclined lines related to it, resulting from the folding of the wedge. As a means of avoiding the repetition of inclined lines, the suggestion of a central horizontal base line was made. This would increase the length of the scale, but would avoid the multiple line design. Preparations were made to try out such a scale.

Revision of 419 and D-472

The discussions on fineness culminated in a vote to revise D-419 on fineness of wool and D-472 on fineness of wool top by incorporating the plan for 2-operator tests and by establishing greater statistical control requirements, and by including the short section procedure as an alternate method.

Special Committee on Fineness Study

In accordance with the plans of Committee D-13 to have greater specialization within its subcommittees and sections, a special fineness committee was planned. The following signified their interest in being associated with it.

| | |
|---|---|
| Abbot Worsted Company | James Lees and Sons Co. |
| Alex. Smith & Sons. Cpt. Co. | Forstmann Woolen Co. |
| American Woolen Company | Pacific Mills |
| Arlington Mills | U. S. Customs Lab. |
| Bigelow-Sanford Cpt. Co. | U. S. Dept. Agriculture |
| Botany Worsted Mills | |
| Continental Mills | |

Representation on B-5

Mr. John Hintermaier and Mr. Louis Tanner were chosen as representatives of Section I on Subcommittee B-5.

Revision of D 584-43

Some difficulty was reported in following the directions for ash determination, Sec. 9, of the method of test for Hard scoured wool (D 584-43). As this difficulty is obviated through the use of a certain type of crucible, revision of the method to incorporate the necessary changes was voted by the meeting. Letter ballot will be issued.

Shrinkage

Mr. F. D. Cronin, Chief of the Wool Division, U. S. Department of Agriculture, discussed the general plan of the shrinkage investigational work being conducted by the Division in connection with the Government's wool purchase and appraisal program. Mr. Buck, of the same division, discussed the equipment used and procedures followed in the shrinkage research, and reviewed results of a number of studies recently conducted. Many of these are reported to the Special Committee of Congress investigating the production, transportation and marketing of wool.

Publications of interest

"Investigation of the Production, Transportation and Marketing of Wool" (Report of Hearings before the Special Committee to Investigate the Production, Transportation, and Marketing of Wool. Part 6, November 19-27, and December 6, 1945). United States Senate.

Demonstrations

Demonstrations were made of the following:

Wedge Scales with fixed base line for fiber measurement.
Adjustable cross section devices for short fiber preparation
Preparation of slides by short-section method
Baird "Transparizor" for vegetable-matter determination
Baird wool dryer for laboratory use

Special Committee on Shrinkage Studies

A special committee on shrinkage research, similar to that on fineness, was set up, with initial representation from the following:

Abbot Worsted Company
American Conditioning House
Lowell Textile Institute
Forstmann Woolen Company
U. S. Department of Agriculture
U. S. Testing Company